Soil NPK sensor

manual

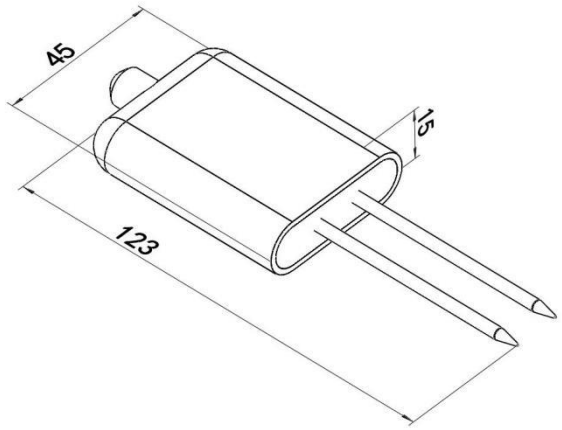
Soil parameters measuring

Nitrogen Phosphorus Potassium	• Measuring range: 1-1999 mg/kg(mg/L) • Resolution：1 mg/kg(mg/L) • Response time: ＜1S
Reminder The measurement of NPK adopts the general rapid detection method, so there are certain errors, Use with caution for planting reference. However, the sensor supports the function of writing NPK data. You can use standard instruments to measure NPK then write in to provide data for monitoring system.	

Specification

Power supply	DC4.5-30V
Max Power consumption	0.5W@24V DC
Protection class	IP68, long-term immersion in water use
Cable length	2M
Operating environment	-40℃-80℃
Overall dimensions	45 * 15 * 123mm

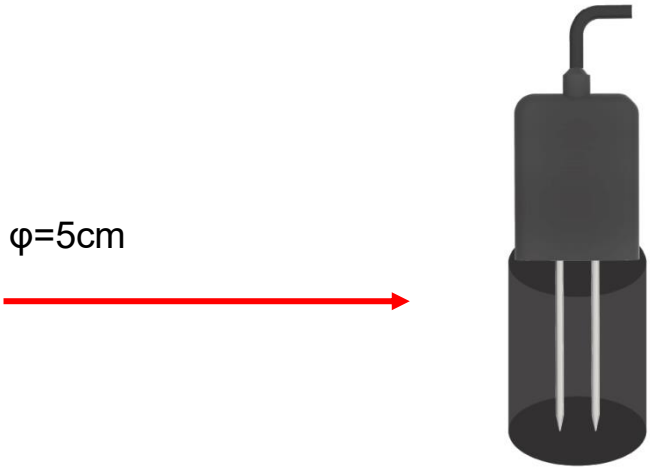
Size



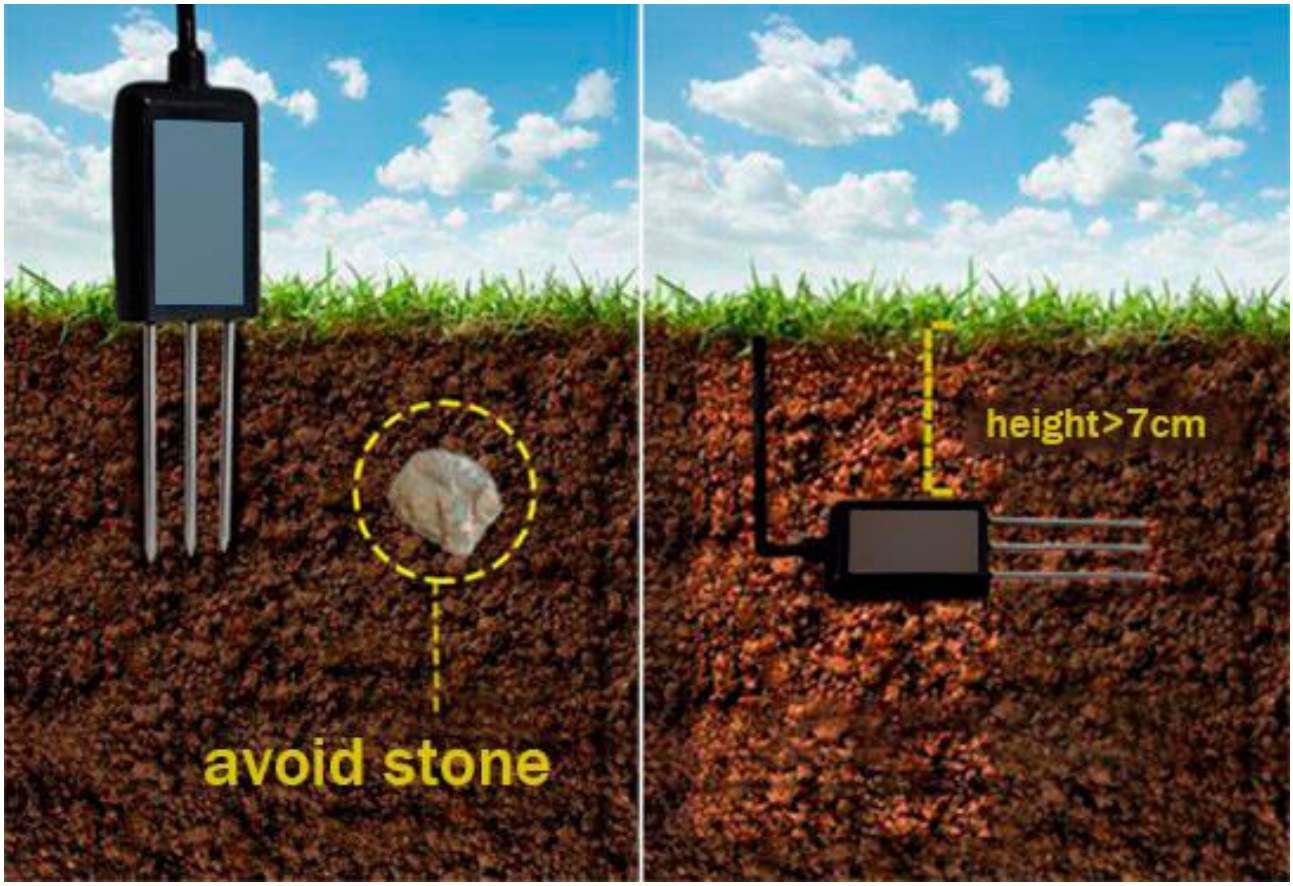
Wiring

Cable color	description
Brown	Power + (DC5-30V)
black	Power -
yellow	RS485 A+
blue	RS485 B-

Measuring range



Installation



RS485 communication

Default parameters: 4800,n,8,1

Default device address is 1

Modbus RTU protocol

Read status registers, read function code: 0x03					
Register address (Hex)	PLC Address (decimal)	meaning	Number of bytes	content	remark
001E	40031	Nitrogen	2	real value	read/write
001F	40032	Phosphorus	2	real value	read/write
0020	40033	Potassium	2	real value	read/write
04E8	41257	Nitrogen factor high byte	2	real value (float)	read / write
04E9	41258	Nitrogen factor low byte	2		
04EA	41259	Nitrogen offset	2		read / write
04F2	41267	Phosphorus factor high byte	2	real value (float)	read / write
04F3	41268	Phosphorus factor low byte	2		
04F4	41269	Phosphorus offset	2		read / write
04FC	41277	Potassium factor low byte	2	real value (float)	read / write
04FD	41278	Potassium factor low byte	2		
04FE	41279	Potassium offset	2		read / write
Parameters registers, read function code: 0x03, write function code: 0x06					
07D0	42001	Slave ID	2	1-254	read / write
07D1	42002	baud rate	2	0: 2400 1: 4800 2: 9600 Default 4800	read / write

factor and offset like the formula

Y=AX+B

Y is reading value

X is original value

A is factor

B is offset

E.g., read Nitrogen, Phosphorus, Potassium together:

Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x00	0x1E	0x00	0x03	0x65	0xCD

Sensor responds:

Address	Function Code	Number of byte	Nitrogen value	Phosphorus value	Potassium value	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x06	0x00 0x20	0x00 0x25	0x00 0x30	0xB1	0x6D

Potassium: 0x20 H= 32 mg/kg
Phosphorus: 0x25 H= 37 mg/kg
Potassium: 0x30 H= 48 mg/kg

Set slave ID

E.g., set slave ID=2, Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	ID	Error Check (Lo)	Error Check (Hi)
0x01	0x06	0x07	0xD0	0x00 0x02	0x08	0x86

Sensor responds:

Address	Function Code	Start Address (Hi)	Start Address (Lo)	ID	Error Check (Lo)	Error Check (Hi)
0x01	0x06	0x07	0xD0	0x00 0x02	0x08	0x86

Set baud rate

E.g., set baud rate to 9600, Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	command	Error Check (Lo)	Error Check (Hi)
0x01	0x06	0x07	0xD1	0x00 0x02	0x59	0x46

Sensor responds:

Address	Function Code	Start Address (Hi)	Start Address (Lo)	command	Error Check (Lo)	Error Check (Hi)
0x01	0x06	0x07	0xD1	0x00 0x02	0x59	0x46

Enquiry slave ID

Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)
0xFF	0x03	0x07	0xD0	0x00	0x01	0x91	0x59

Sensor responds:

Address	Function Code	Number of Points	address	Error Check (Lo)	Error Check (Hi)
0xFF	0x03	0x02	0x00 0x01	0x50	0x50